

CLAIMS

We claim:

1. A compound that competitively inhibits binding of CSP to *S. mutans* histidine kinase.
2. The compound of claim 1, comprising a peptide or an antibody.
3. The compound of claim 2, comprising a derivative of [SEQ ID NO:2], a fragment of [SEQ ID NO:2] or a derivative of a fragment of [SEQ ID NO:2].
4. The compound of claim 3, wherein amino acids are removed from the N-terminus and/or C-terminus of [SEQ ID NO:2].
5. A pharmaceutical composition comprising all or part of the peptide of claims 1 to 4 and a carrier.
6. A method of medical treatment or prophylaxis of caries or endocarditis, comprising administering the compound of any of claims 1 to 4 or the pharmaceutical composition of claim 5.
7. An isolated nucleic acid molecule encoding a *S. mutans* competence signal peptide, or a fragment of a peptide having CSP activity.
8. An isolated nucleic acid molecule encoding a competence signal peptide, or a fragment of a competence signal peptide having *S. mutans* competence signal peptide activity, comprising a nucleic acid molecule selected from the group consisting of:
a nucleic acid molecule that hybridizes to all or part of a nucleic acid molecule shown in [SEQ ID NO:1], the fragment of [SEQ. ID NO:1] encoding [SEQ ID NO:2] or a complement thereof under moderate or high stringency hybridization conditions;
a nucleic acid molecule degenerate with respect to (a).
9. An isolated nucleic acid molecule encoding a competence signal peptide, or a fragment of a competence signal peptide having *S. mutans* competence signal peptide activity, comprising a nucleic acid molecule selected from the group consisting of:
the nucleic acid molecule of the coding strand shown in [SEQ ID NO:1], or a complement thereof;
a nucleic acid molecule encoding the same amino acid sequence as a nucleotide sequence of (a); and

- Sub A26 Sub D1
23. The polypeptide of claim 22 comprising a *S. mutans* CSP.
24. The polypeptide of claim 23 comprising all or part of an amino acid sequence in [SEQ ID NO:2].
25. A polypeptide fragment of the peptide of claim 24, or a peptide mimetic of the CSP.
- Sub A27 Sub D1
26. The polypeptide of claim 24 which is recombinantly produced.
27. A polypeptide comprising a sequence having greater than 30%, 50% or 60% sequence identity to the polypeptide of claim 24.
28. The polypeptide of claim 24, isolated from *S. mutans*.
29. An isolated nucleic acid molecule encoding the polypeptide of any of claims 21 to 28.
30. An antibody directed against the polypeptide of any of claims 21 to 28.
- Sub A28 Sub D1
31. The antibody of claim 30, comprising a monoclonal antibody or a polyclonal antibody.
32. A vaccine composition comprising all or part of the peptide of any of claims 21 to 28 and a carrier.
33. The vaccine composition of claim 32, wherein the peptide is coupled to a compound comprising all or part of KLH, ovalbumin, or thyroglobulin.
34. A method of evaluating caries-reducing properties of a compound comprising contacting the compound with:
CSP, a HK-binding fragment of CSP or a derivative of either of the foregoing; and
HK, a CSP binding fragment of HK or a derivative of either of the foregoing;
wherein (a) and (b) are capable of binding; and determining the ability of the compound to interfere with the binding of a) with b), the ability to interfere with binding indicating that the compound reduces caries.
35. A method of evaluating caries-reducing properties of a compound comprising contacting the compound with:
a DNA vector encoding a marker gene; and
a *S. mutans* culture;

by determining whether the compound reduces uptake of the DNA vector into the *S. mutans* culture, the reduced uptake of the DNA vector indicating that the compound reduces caries.

36. The method of claim 35, wherein reduction of caries is indicated by reduced transformation efficiency in *S. mutans*.

37. The method of claim 35, wherein reduction of caries is indicated by determining changes in the physiological characteristics of biofilm formation and acid tolerance in *S. mutans*.

FOOTNOTES 27000000